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SYMMETRICAL FIGURES IN BIRDS' FEATHERS.

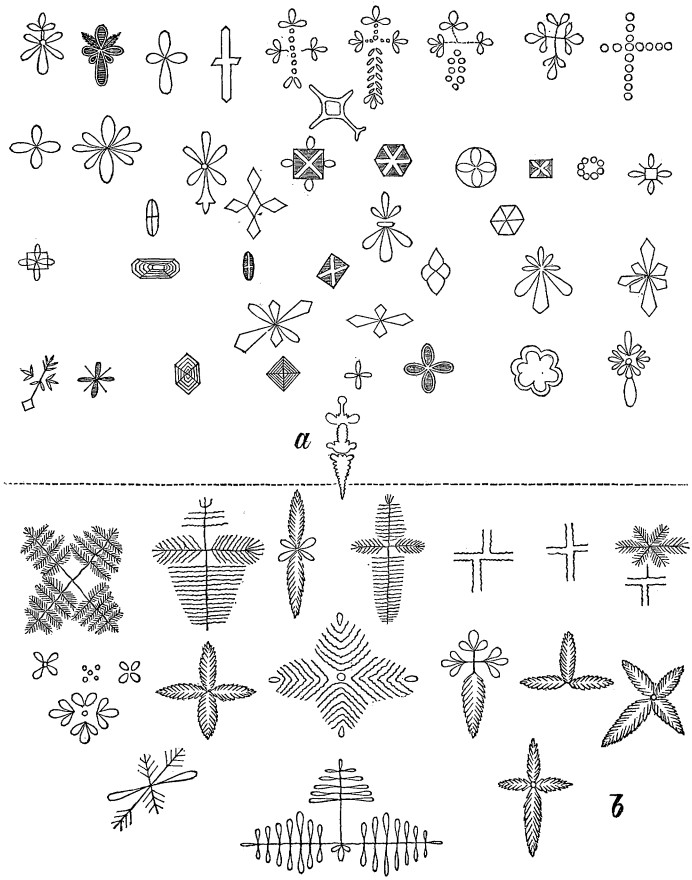
BY GRACE ANNA LEWIS.

In the summer of 1869, whilst examining the feather capsule of a nestling dove, the microscopic slide was suddenly covered with a multitude of exquisite forms. Lost in admiration of the beauty of these brilliants, as seen under the effects of sun-light, for a time I forgot every thing else, but presently remembering that others might enjoy the sight as much as myself, I seized a pencil and rapidly transferred the outlines to paper, continuing until twilight obscured them from view. Resting for an hour, I returned to my microscope, but all had vanished like a dream,—nothing was left but a few drops, looking like perspiration on the face of the glass.

The next day my German farmer climbed to the dove's nest and procured a few more pen-feathers. Some of these were cut into fine shreds, rubbed in a drop of water, and placed under the microscope. In a short period the figures of yesterday were again before me. From the cut surfaces of the portions of the pen-feathers I had placed under the lens, granules appeared to stream forth like blood, covering the microscopic slide in countless numbers. Mingled with these were numerous larger cells of a globular or oval form, having a transparent centre. These and the granules, gave to the water a slightly glutinous consistency. As the fluids on the glass dried, lines at different angles shot across the slide, looking much as though an unseen camel's hair pencil

had been swiftly drawn in opposite directions, sometimes at right angles but frequently at angles more acute. Probably, at the moment of transition from a fluid to a solid condition, the transparent centred, or nucleated, cells assumed the form of a square,

Fig. 119.



Symmetrical Figures in Birds' Feathers.

a lozenge, a starry hexagon, a cross, or any other beautiful figure which could be formed of the parts which suddenly appeared in the spherical cells, these parts seeming at first, in some instances, at least, to consist of minute triangles.

At the same moment the little granules moved to order, and

there before the astonished gaze were diamonds such as Aladdin might have envied, in form as varied, but far more symmetrical than the frost work on a window pane of a winter's morning.

Some of the figures, as I afterwards found on repeated trial, retained their outlines for several hours, in a few instances for days, even when exposed to the moisture of the atmosphere. When examined by lamp-light many, but not all, cast an undoubted shadow. The exceptions appeared to be symmetrical *depressions* instead of raised figures.

These figures must, of course, be common to skilled microscopists. It is not at all probable that forms due to universal causes should remain unseen ever since the invention of the microscope, but to me they were a new revelation, and I watched their formation with intense interest, as the work of polarizing forces whose operation is co-extensive with the universe, and to which all things material are subjected. As the law of gravitation may be observed in a drop of dew as well as in the circling orbs, so it seemed possible for these tiny jewels to elucidate principles of farthest reaching power.

The frost work, annually repeated, is not less beautiful or interesting because it is common, nor do snow crystals grow unlovely because we have seen them before;—the value of neither is lost when they are perceived to be related to certain other symmetrical forms, but on the contrary, all the members of the related groups rise in importance when they are understood to be varying expressions of one eternal omnipresent law of matter,—operating alike in dead and living forms, but according to modes peculiar to unorganized or to organized matter.

One very beautiful form is not given in the cut. It was less distinct then the rest and I waited for a better example to copy. It never appeared again. It was a circle with ornaments at four opposite points, but as I cannot remember the exact style of the ornament, I do not venture to give even a suggestion of the figure. Other very beautiful designs were lost in the same way. Water containing material from the feathers of the common barn-door fowl produced, mainly, simple crosses, the lines usually crossing in the middle, but even in this, some beautiful six-rayed forms were seen. The feathers of the domestic turkey yielded more arborescent forms, as those seen at *b*, which are larger and stronger than those afforded by the feathers of the dove, shown at *a*.

The majority of these symmetrical figures do not possess the sharp outline of crystals, whilst others can doubtless be referred to the mineral salts held in solution in the composition of the feather. There are both rounded and sharply defined figures,—a fact which any one can verify by the microscope. If I am not mistaken, the crystalline forms are derived from the nucleated cells, and the rounded figures from the granular matter.

Of the conditions necessary to produce these forms I know absolutely nothing. I have never yet succeeded in obtaining them from feathers which had long been removed from the *living bird*. This, however, proves nothing as I have frequently failed to procure any from freshly dropped or plucked feathers, which yield them most readily. Of different cuttings from the same feather made during the same minute, and apparently subjected to the same treatment, some presented figures whilst others did not.

BULLOCK'S ORIOLE.

BY ELLIOTT COUES.

ALTHOUGH the beautiful bird referred to in the works cited* has been known by name for nearly half a century, no complete biography has yet appeared; and doubtless many readers of the NATURALIST will be glad to have such information as we can furnish from our study of its habits. We will premise that it is a near relative of the Baltimore oriole, or fire-bird, or hangnest, as it is indifferently called; a bird whose striking colors and brilliant vocal powers, together with its abundance in our streets and orchards, have made it a well-known favorite. Like the Baltimore, it is chiefly black and orange in color, but it differs in having a large white patch on the wings, and the sides of the head and neck orange instead of black. The female, as in all the orioles, is smaller than the male and with hardly a trace of his

*_Xanthorthus Bullockii_ SWAINSON, Phil. Mag. i, 1827, p. 436.—AUDUBON, Orn. Biog. v, 1839, p. 9, pls. 388, 433, and 8vo, ed. iv, 1842, p. 43, pl. 218.—Pacific Railroad Reports, vi, 1857, p. 87; ix, 1858, p. 549; x, 1859, p. 52; xii, 1859, p. 209, and Mex. Bound. Survey, ii, pt. 2, 1859, p. 20.—COUES, Proc. Acad. Nat. Sci., Philada., 1866, p. 55.—COOPER, Cal. Birds, i, p. 273.—*Psarocolius auricollis* of MAXIMILIAN.